



Spatiotemporal trends and climatic factors of hemorrhagic fever with renal syndrome epidemic in Shandong Province, China

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Abstract:

BACKGROUND: Hemorrhagic fever with renal syndrome (HFRS) is a rodent-borne disease caused by Hantaviruses. It is endemic in all 31 provinces, autonomous regions, and metropolitan areas in mainland China where human cases account for 90% of the total global cases. Shandong Province is among the most serious endemic areas. HFRS cases in Shandong Province were first reported in Yutai County in 1968. Since then, the disease has spread across the province, and as of 2005, all 111 counties were reported to have local human infections. However, causes underlying such rapid spread and wide distribution remain less well understood. **METHODS and FINDINGS:** Here we report a spatiotemporal analysis of human HFRS cases in Shandong using data spanning 1973 to 2005. Seasonal incidence maps and velocity vector maps were produced to analyze the spread of HFRS over time in Shandong Province, and a panel data analysis was conducted to explore the association between HFRS incidence and climatic factors. Results show a rapid spread of HFRS from its epicenter in Rizhao, Linyi, Weifang Regions in southern Shandong to north, east, and west parts of the province. Based on seasonal shifts of epidemics, three epidemic phases were identified over the 33-year period. The first phase occurred between 1973 and 1982 during which the foci of HFRS was located in the south Shandong and the epidemic peak occurred in the fall and winter, presenting a seasonal characteristic of Hantaan virus (HTNV) transmission. The second phase between 1983 and 1985 was characterized by northward and westward spread of HFRS foci, and increases in incidence of HFRS in both fall-winter and spring seasons. The human infections in the spring reflected a characteristic pattern of Seoul virus (SEOV) transmission. The third phase between 1986 and 2005 was characterized by the northeast spread of the HFRS foci until it covered all counties, and the HFRS incidence in the fall-winter season decreased while it remained high in the spring. In addition, our findings suggest that precipitation, humidity, and temperature are major environmental variables that are associated with the seasonal variation of HFRS incidence in Shandong Province. **CONCLUSIONS:** The spread of HFRS in Shandong Province may have been accompanied by seasonal shifts of HTNV-dominated transmission to SEOV-dominated transmission over the past three decades. The variations in HFRS incidence were significantly associated with local precipitation, humidity, and temperature.

Source: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2919379>

Resource Description

Exposure : ☐

weather or climate related pathway by which climate change affects health

Climate Change and Human Health Literature Portal

Meteorological Factors, Precipitation, Temperature

Temperature: Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: China

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Zoonotic Disease

Zoonotic Disease: Hantavirus Pulmonary Syndrome, Other Zoonotic Disease

Zoonotic Disease (other): Hemorrhagic fever with renal syndrome

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content